SITE INSPECTION WORKSHEETS

13

SDMS DocID 583202

CERCLIS IDENTIFICATION NUMBER
CTD981898406

SITE LOCATION

SITE NAME: LEGAL, COMMON, OR DESCRIPTIVE NAME OF SITE			
BRISTOL COMPANY			
STREET ADDRESS, ROUTE, OR SPECIFIC LOCATION IDENTIFIER			
40 BRISTOL STREET			
CITY	STATE	ZIP CODE	TELEPHONE
WATERBURY	CT	06708	( ) N/A
COORDINATES: LATITUDE and LONGITUDE	TOWNSHIP, RANGE, AND SECTION		
41°31'30"N 73°03'10"W	N/A		

OWNER/OPERATOR IDENTIFICATION

OWNER			OPERATOR		
NORMAN DRUBNER			N/A		
OWNER ADDRESS Drubner, Hartley + O'Connor			OPERATOR ADDRESS		
414 Meadow Street					
CITY			CITY		
WATERBURY					
STATE	ZIP CODE	TELEPHONE	STATE	ZIP CODE	TELEPHONE
CT	06702	(203) 753-9291			( )

SITE EVALUATION

AGENCY/ORGANIZATION			
WESTON/ARCS			
INVESTIGATOR			
GREGG W. GABINELLE			
CONTACT			
JANE ANDERSON, SAM, EPA SUPERFUND SUPPORT SECTION (HSS-CAN7)			
ADDRESS			
JOHN F. KENNEDY FEDERAL BUILDING			
CITY		STATE	ZIP CODE
BOSTON		MA	02203-2211
TELEPHONE			
(617) 573-9698			

(1)

GENERAL INFORMATION

Site Description and Operational History: Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references.

The Bristol Company (Bristol) is located at 40 Bristol Street in Waterbury, New Haven County, Connecticut (latitude 41° 31' 30" North, longitude 73° 03' 10" West). Bristol operated on the property from approximately 1897 until 1961. Bristol produced a line of instrumentation including temperature controls, chemical sensors, recorders and indicating devices for industrial use. Babcock Wilcox, Ltd., the Bristol Babcock Company and the American Chain and Cable Company manufactured similar products on-site between 1961 and September 1988. The property has been vacant since September 1988 [2,3].

The approximately 17 acre Bristol property is located in a residential and commercial zoned area of Waterbury [4]. According to the City of Waterbury Tax Assessor's records, the property is located on Map 545, Block 1177 and Lot 6 [5]. The property is immediately bordered to the west and north by narrow wooded areas approximately 100 feet wide, to the east by the Boston and Maine Railroad and the Naugatuck River and to the south by a wooded area. Land uses in the site vicinity include single family residential to the west, single and multi-family residential to the north, residential, commercial and industrial to the east across the Naugatuck River and residential and vacant land to the south [2].

The Bristol property is centrally divided by Bristol Street. Bristol's manufacturing buildings are located on the northern half of the property while the administrative and maintenance buildings and employee parking area are located on the southern half. Pedestrian access to the northern half of the property is restricted by a six foot chain link fence. Access to the two vehicular entrances to the manufacturing portion of the property is restricted by locking gates. Vehicular and pedestrian access to the southern half of the property is unrestricted [2].

Fifteen interconnected Bristol manufacturing buildings are located on the northern half of the property. Buildings are constructed of brick and steel with concrete slab floors. The buildings range from one to six stories in height. The oldest building, constructed around 1897, is located along Bristol Street while the newest, constructed around 1966, is the northernmost. Two small brick structures, formerly housing a pump house and fire house, are located on the western portion of the property near the western entrance to the manufacturing areas [2].

Primary shipping and receiving areas are located on the north side of the northernmost building and along the east side of the complex [2]. Two outdoor, unsheltered former hazardous waste storage areas were observed on the west side of the manufacturing complex during the WESTON/ARCS on-site reconnaissance (OSR). Both areas were covered with bituminous asphalt in good condition, without asphalt staining or corrosion. Both areas covered approximately 275 square feet and were enclosed by three inch asphalt berms, which also appeared to be in good condition. WESTON/ARCS observed a stopcocked drain on the south side of the westernmost former storage area. No asphalt staining leading from the drain on the southern former storage area was noted [2]. A third former unbermed storage area is located on a partially sheltered concrete pad at the southwest corner of the courtyard on the east side of the manufacturing complex. WESTON/ARCS did not observe any concrete staining in this area during the OSR [2]. No residual waste was noted in any of the former storage areas.

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WESTON/ARCS observed four apparently empty steel above ground storage tanks on the manufacturing portion of the property. One of the tanks is located against the west central wall of the manufacturing complex. Three tanks are located against the manufacturing complex walls in the courtyard on the eastern side of the complex. The tanks are located on concrete and/or asphalt and WESTON/ARCS did not observe any staining beneath or around the tanks. WESTON estimates the capacities of each of these tanks to be approximately 500 gallons. Bristol reportedly used these tanks for storage of solvents such as trichloroethene (TCE). The tanks are estimated to be approximately 30 years old, based on visual observations of rusting [2].

WESTON/ARCS observed an area of oily staining on the manufacturing complex eastern wall in the courtyard. According to the site contact, Mr. Mike Palumba, a 1,000 gallon waste oil underground storage tank (UST) was removed from this area in 1989. WESTON/ARCS noted an area of soil around the former tank, covering approximately 30 square feet, which appeared to have been removed and replaced with sand fill [2].

WESTON/ARCS noted an area of disturbed soil, covering approximately 1,000 square feet, on the east central side of the complex. According to Mr. Palumba, two steel 10,000 gallon No. 4 heating oil USTs were removed from this area in 1989. Mr. Palumba stated that the tanks were contained in a masonry vault with a concrete floor and roof [2].

One gasoline pump and associated steel 10,000 gallon UST fill pipe were noted on the south side of the maintenance garage. Mr. Palumba indicated that the pump was used to fuel Bristol maintenance vehicles. According to Mr. Palumba, a steel 8,000 gallon No. 4 fuel oil UST is located on the east side of the administrative building and a steel 2,500 gallon fuel oil UST is located near the southwest corner of the maintenance building. [2]. All fuel oil and gasoline tanks on the property were reportedly installed during the 1950s [8].

WESTON/ARCS observed two transformer pads on the east side of the manufacturing complex and one pad within an asphalt courtyard on the south side of the complex. In each of the three areas, three unlabelled transformers were observed situated on unbermed concrete pads, enclosed by a eight foot chain linked and barbed wire fence. Vandalization of all the transformers had caused extensive transformer oil leakage onto surrounding concrete and asphalt. An estimated total area of 1,000 square feet of surface staining was noted around these transformers [2].

One dust collection baghouse was observed by WESTON/ARCS on the west side of the manufacturing complex and another in the eastern courtyard. The site contact indicated that these units were used for dust collection from metal working operations. The doors of both dust collection units were open, revealing approximately 75 cubic feet of accumulated metal fragments and dust in each unit. WESTON/ARCS did not observe any asphalt staining around the western unit nor any soil staining around the courtyard unit [2].

WESTON/ARCS observed a large exhaust fan in the west wall of the manufacturing complex. An approximately 500 square foot area of asphalt and sediment beneath and around this fan had an oily black staining. Metal springs were also observed in the stained sediment. A rusty 55 gallon drum, labelled as trichloroethene, was noted by WESTON/ARCS approximately 15 feet south of the stained area. The drum appeared to be empty [2].

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At the south end of the property, south of the employee parking lot, WESTON/ARCS observed an area of disturbed soil, covering approximately 10,000 square feet, which appeared to have been excavated. Mr. Palumba reported that this area had been used for illegal waste trichloroethene (TCE) disposal by an individual or company not associated with Bristol during the mid-1980s and that the area had been remediated under CT DEP guidance between 1987 and 1990 [2]. Mr. Palumba did not know who was responsible for the unauthorized disposal.

Three flush mounted groundwater monitoring wells were observed on the manufacturing portion of the property by WESTON/ARCS: one well is located on the west side of the complex, one in an area of corroded asphalt in the eastern courtyard and one in the eastern driveway, approximately 15 feet east of the transformer pad [2].

WESTON also observed several piles of household and yard waste totalling approximately 50 cubic yards, approximately 50 feet north of the soil remediation area at the south end of the employee parking lot. Mr. Palumba reported that local residents use this area for refuse disposal [2].

A one story concrete and cinderblock building, located at 57 Bristol Street, was noted on the western border of the Bristol property, west of the Bristol administrative building. The building is occupied by Foster Enterprises, Inc., which is involved in the assembly of generator parts. According to Mr. Palumba, Foster leases the building and no manufacturing is conducted on the premises [2].

Manufacturing operations have occurred on the subject property since approximately 1897 when the first manufacturing buildings were constructed [2]. Additional manufacturing buildings were constructed during the 1920s until approximately 1960 [8]. Of the 15 interconnected on-site manufacturing buildings currently present, the northernmost building is reportedly the most recent [2]. The administration building was reportedly constructed during the 1920s and the maintenance garage during the 1940s [8].

Property use prior to 1897 could not be determined. Bristol operated on the property from approximately 1897 until 1961. Between 1961 and 1978, the American Chain and Cable Company operated on-site. Between 1978 and 1981, the facility operated as Babcock Wilcox, Ltd. and between 1981 and the facility closing in September 1988, it operated as the Bristol Babcock Company (Bristol Babcock) [9]. The Bristol Babcock Helicoid Instrument Division was reportedly absorbed into Bristol Babcock in 1986 [10]. All operations reportedly involved the same types of manufacturing processes and chemicals [9].

The Bristol property has been owned by Norman S. Drubner since December 23, 1986. At that time, the property was sold by Bristol Babcock to Mr. Drubner with a Form III filing to the CT DEP [11]. Bristol Babcock ceased its manufacturing operations in September 1988 and moved to Watertown, CT [8,12].

No information concerning the Bristol Company was located during the State file search. Most State file information identified pertained to Bristol Babcock. However, both operations likely involved similar manufacturing processes, the use of similar chemicals and the generation of similar wastes.

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Bristol manufactured pneumatic, electrical and mechanical controlling systems. On-site operations included drilling, milling, stamping and grinding of metal bar stock, vapor degreasing, nickel, cadmium and copper electroplating, epoxy and enamel painting, soldering and welding [3,12]. Steel, brass and aluminum bar stock and a variety of chemicals including acids, metal plating solutions, cutting and lubricating oils, paints and organic compounds such as TCE, 1-1-1-trichloroethane (TCA), chloroform, methyl chloride and toluene were used in the manufacturing process [12]. A metal plating shop was located at the southwest side of the building.

Virgin solvents were stored in the outdoor above ground tanks described in the previous section, in 55 gallon drums inside manufacturing portions of the complex; the two outdoor hazardous waste storage areas on the west side of the manufacturing complex; and possibly the outdoor storage area in the eastern courtyard. Virgin acids were also reportedly stored in the outdoor hazardous waste storage areas as well as inside the manufacturing buildings [8].

Bristol Babcock generated a variety of wastes from manufacturing, including spent solvents, acids, cyanide, oils, paint thinner and paint and metal hydroxide sludge. Bristol Babcock was listed as a RCRA large quantity hazardous waste generator (EPA ID No, CTD001456979). Solvents for degreasing were reportedly reused until they developed a sludge consistency. Bristol Babcock reportedly used a licensed RCRA waste transporter for off-site disposal of the resulting sludge approximately every two to three months. As stated in the PA, in 1987 Bristol Babcock generated approximately 2,000 gallons of nickel sludge and 1,200 gallons of copper and chromium sludge annually [12].

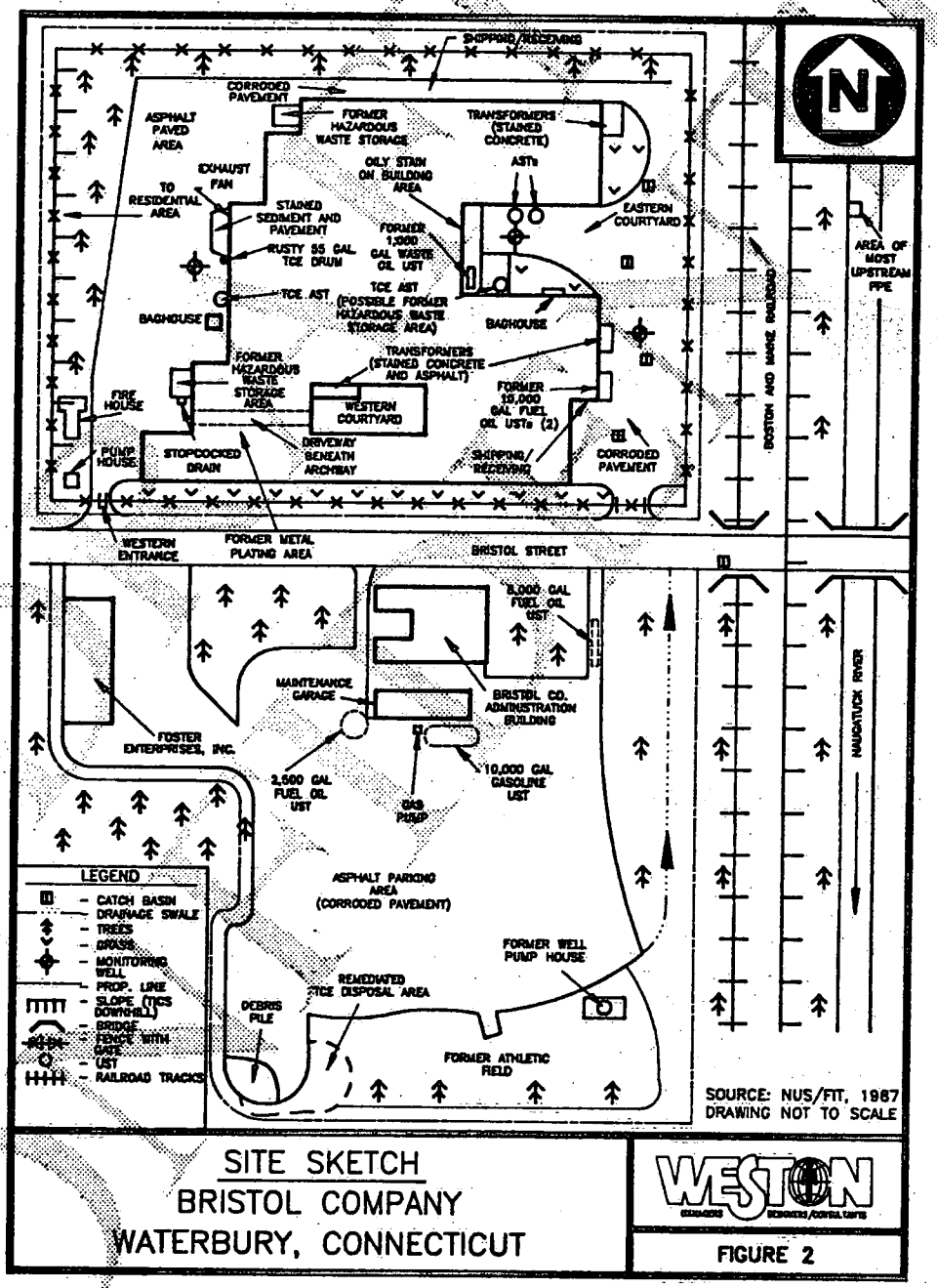
A 1983 Biennial Hazardous Waste Generator Report for Bristol Babcock indicated that 88 gallons of waste TCE (F001) were hauled to Hampden Color and Chemical in Springfield, MA for disposal and the following wastes were hauled to Recycling Industries in Quincy, MA: 385 gallons of waste paint (D001); 1,540 gallons of wastewater treatment system sludge (F006); 595 gallons of waste cyanide (D003) and 1,760 gallons of waste acid (F006) [3]. In addition, approximately 150 gallons of waste oil were generated per month and stored in the on-site waste oil tank. Waste oil was hauled off-site by the Connecticut Waste Oil Company [13].

Waste solvents, acids and empty 55 gallon drums were stored in the two outdoor bermed storage areas on the west side of the manufacturing building and possibly in the storage area in the eastern courtyard. Empty 55 gallon drums were also stored on a driveway beneath an archway entrance to the western courtyard [8]. Waste management practices prior to the 1980s could not be determined from available file information or the site contact.

Metal hydroxide sludge was also generated from on-site wastewater treatment system used for metal finishing wastewater. Bristol Babcock discharged an average total of 14,440 gallons per day (gpd) of treated wastewater to the Naugatuck River under a National Pollutant Discharge Elimination System (NPDES) Permit Number CT 0000035 [12,14,15]. The waste water treatment system was installed in 1971 [16]. Between 1971 and 1988, an estimated 200 to 800 gallons of metal hydroxide sludge were generated annually from the wastewater treatment system and hauled off-site for disposal approximately every 75 to 80 days [8].

GENERAL INFORMATION (continued)

Site Sketch: *Provide a sketch of the site. Indicate all pertinent features of the site and nearby environments including sources of wastes, areas of visible and buried wastes, buildings, residences, access roads, parking areas, fences, fields, drainage patterns, water bodies, vegetation, wells, sensitive environments, and other features.*



SITE SKETCH
BRISTOL COMPANY
WATERBURY, CONNECTICUT

WESTON

FIGURE 2

GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2), surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).

Source Evaluation for the Bristol Company

	Potential Source Area	Containment Factors	Spatial Location
(1)	Former Outdoor Hazardous Substance and Waste Storage Areas (3)	Asphalt floors and berms (two western areas; concrete slab (eastern area).	Two on west side of industrial complex; one possibly located in eastern courtyard.
(2)	Former Empty Drum Storage Area	Asphalt pavement	Beneath building archway at western courtyard entrance.
(3)	Baghouses (2)	None	One on west side of complex; one in eastern courtyard.
(4)	Outdoor Above Ground Bulk TCE Storage Tanks (4)	Concrete and asphalt beneath tanks	One tank on west side of complex; three tanks in eastern courtyard.
	Former Petroleum Product USTs (5)	None	Two - 10,000 gal. fuel oil USTs on east side of industrial complex; one 8,000 gal. fuel oil UST on east side of admin. building; one 10,000 gal. gasoline UST on south side of garage and one 2,500 fuel oil UST at southwest corner of garage.

[2] (Continued)

Hazardous Waste Quantity (HWQ) Calculation: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2). Note: Potential source areas are combined wherever possible.

Source 1 Former outdoor hazardous materials/waste storage areas (1)
Source 2 Former outdoor empty drum storage area

Tier C: volume
Source 1+2 = estimated average of 75 drums
HWQ: 75 ÷ 10 = 7.5

Source 3 Dust Collection baghouses (2):

Tier C: volume
Source: other = 75 ft³ x 2 = 150 ft³
HWQ: 150 ft³ ÷ 67.5 = 2.2

Note: Only numbered sources in above source evaluation table are evaluated. Potential source areas in buildings have assumed containment values of 0.

Attach additional pages, if necessary

HWQ = [redacted]

GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2), surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).

Source EVALUATION FOR BRISTOL COMPANY (CONTINUED)

(5)	Former Waste Oil UST	None	One 1,000 gal. UST in eastern courtyard.
(6)	TCE Drum	Asphalt pavement	West side of industrial complex.
(7)	Stained Sediment Area	Asphalt beneath sediment	West side of building beneath exhaust fan.
(8)	Electrical Transformers (12) and Capacitors (22)	Concrete pads and asphalt	Three outdoor transformers in western courtyard and six outdoor transformers on east side of complex. Remainder of transformers and capacitors inside building interiors.
	Former Metal Plating Shop	Building floors, walls and ceilings	Southwest corner of complex.
	Former Wastewater Treatment Plant	Building floors, walls and ceilings	Unknown.
(9)	Former NPDES Discharge	None	Former discharge to Naugatuck River.
	Former Screw Machine Area	Building floors and walls	Unknown
	Former Paint Spraying Area	Building floors and walls	Unknown

(continued): 2

Hazardous Waste Quantity (HWQ) Calculation: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

Source 4:
Former outdoor bulk chemical above-ground storage tanks (4):

Tier: C Volume
Source: Tanks 4 x 500 gal/ea = 2,000 gal
HWQ: 2,000 gal ÷ 500 = 4

OR
Tier: A Hazardous Constituent Quantity (TCE)
Source: N/A
HWQ: 2,000 gal TCE x 10 lbs/gal = 20,000 lbs ÷ 1 = 20,000

Source 5:
(M) Former waste oil UST:

Tier: C volume
Source: Tank 1,000 gal
HWQ: 1,000 gal ÷ 500 = 2

OR
Tier: B - Hazardous wastream
Source: N/A
HWQ: 1,000 gal x 10 lbs/gal = 10,000 lbs ÷ 5,000 lbs = 2

Note: former petroleum USTs not evaluated - petroleum product exclusion

Attach additional pages, if necessary

HWQ = X

GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2), surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).

SOURCE EVALUATION FOR BRISTOL COMPANY

(CONTINUED)

	Former Metal Processing Area	Building floors and walls	Unknown
	Former Welding/Soldering Area	Building floors and walls	Unknown
	Former TCE Disposal Area	None	South of employee parking lot.
10	TCE Contamination Areas (2)	None	Eastern courtyard and west side of Foster Enterprises building.
11	Miscellaneous Debris Area	None	South end of employee parking lot.
12	Drainage Swale	None	East of employee parking lot.

[2]

Hazardous Waste Quantity (HWQ) Calculation: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

Source 6 TCE Drum:

Tier: B Hazardous Wastestream

HWQ: 1 drum = 50 gals × 10 lbs/gal = 500 lbs

500 ÷ 5,000 = 0.1

Source 7 Stained sediment area (2,500 ft³)

Source 8 Stained soil around transformers (4,000 ft³)

Source 10 TCE contaminated soil areas (2) (67,500 ft³) total

Tier: C: Volume

Source: Contaminated Soil

HWQ: 74,000 ft³ ÷ 67,500 = 1.1

Source 9: Former NPDES Discharge

Tier B - Hazardous wastestream quantity

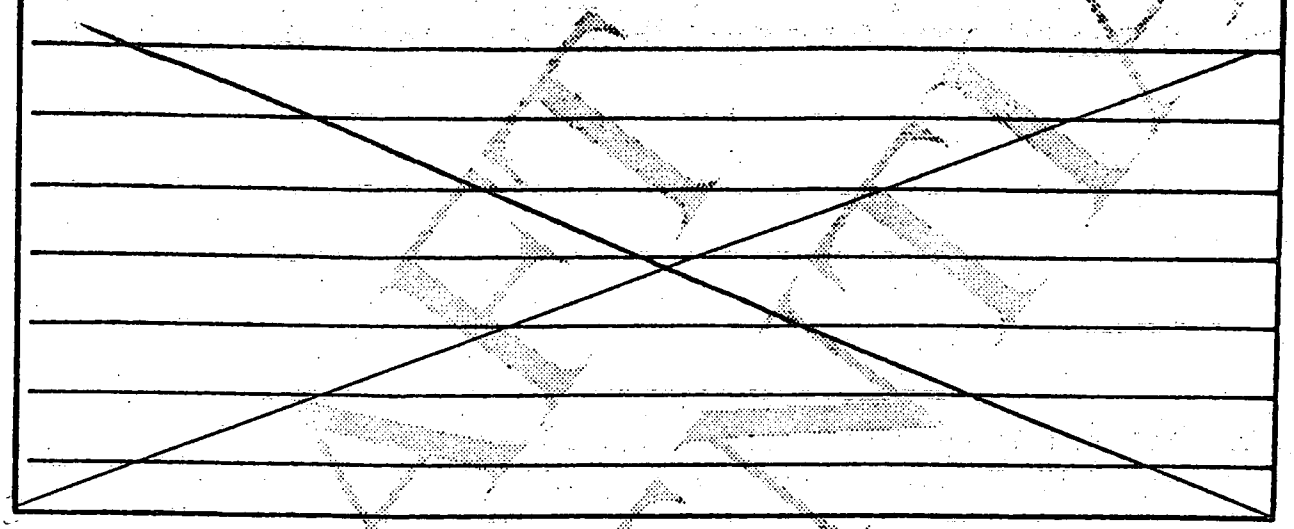
HWQ: 14,400 gal/day × 260 days/yr × 17 yrs = 63,648,000 gal

63,648,000 gal × 10 lbs/gal = 636,480,000 lbs ÷ 5,000 =

Attach additional pages, if necessary 12,730 HWQ = X

GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2), surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).



Hazardous Waste Quantity (HWQ) Calculation: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

Source 11 Miscellaneous Debris Area:

Tier C, volume
Source: pile

HWQ: 50cy ÷ 2.5 = 20

Source 12 Drainage Swale:

Tier: D area
Source: Contaminated soil

HWQ: 500 ft long x 3 ft wide = 1,500 ft²
1,500 ft² ÷ 34,000 = 0.04

Total = 7.5 + 2.2 + 20,000 + 2 + 0.1 + 1.1 + 12,730 + 20 + 0.04 =
32,763
FROM SI TABLE 2 - HWQ = 10,000

Attach additional pages, if necessary

HWQ = 10,000

SI TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

		Single Source Sites (assigned HWQ scores)	
(Column 1) TIER	(Column 2) Source Type	(Column 3) HWQ = 10	(Column 4) HWQ = 100
A Hazardous Constituent Quantity	N/A	HWQ = 1 if Hazardous Constituent Quantity data are complete HWQ = 10 if Hazardous Constituent Quantity data are not complete	>100 to 10,000 lbs
B Hazardous Wastestream Quantity	N/A	≤ 500,000 lbs	>500,000 to 50 million lbs
C Volume	Landfill	≤ 6.75 million ft^3 ≤ 250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3
	Surface Impoundment	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3
	Drums	≤1,000 drums	>1,000 to 100,000 drums
	Tanks and non-drum containers	≤50,000 gallons	>50,000 to 5 million gallons
	Contaminated soil	≤6.75 million ft^3 ≤250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3
	Pile	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3
	Other	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3
D Area	Landfill	≤340,000 ft^2 ≤7.8 acres	>340,000 to 34 million ft^2 >7.8 to 780 acres
	Surface Impoundment	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres
	Contaminated soil	≤3.4 million ft^2 ≤78 acres	> 3.4 million to 340 million ft^2 > 78 to 7,800 acres
	Pile	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres
	Land treatment	≤27,000 ft^2 ≤0.62 acres	>27,000 to 2.7 million ft^2 >0.62 to 62 acres

TABLE 1 (CONTINUED)

Single Source Sites (assigned HWQ scores)		Multiple Source Sites		
(Column 5) HWQ = 10,000	(Column 6) HWQ = 1,000,000	(Column 7) Divisors for Assigning Source WQ Values	(Column 2) Source Type	(Column 1) TIER
>10,000 to 1 million lbs	> 1 million lbs	lbs ÷ 1	N/A	A Hazardous Constituent Quantity
>50 million to 5 billion lbs	> 5 billion lbs	lbs ÷ 5,000	N/A	B Hazardous Wastestream Quantity
>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3	> 67.5 billion ft^3 > 2.5 billion yd^3	ft^3 ÷ 67,500 yd^3 ÷ 2,500	Landfill	C Volume
>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	> 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5	Surface Impoundment	
>100,000 to 10 million drums	> 10 million drums	drums ÷ 10	Drums	
>5 million to 500 million gallons	> 500 million gallons	gallons ÷ 500	Tanks and non-drum containers	
>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3	> 67.5 billion ft^3 > 2.5 billion yd^3	ft^3 ÷ 67,500 yd^3 ÷ 2,500	Contaminated Soil	
>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	> 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5	Pile	
>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	> 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5	Other	
>34 million to 3.4 billion ft^2 >780 to 78,000 acres	> 3.4 billion ft^2 >78,000 acres	ft^2 ÷ 3,400 acres ÷ 0.078	Landfill	D Area
>130,000 to 13 million ft^2 >2.9 to 290 acres	> 13 million ft^2 > 290 acres	ft^2 ÷ 13 acres ÷ 0.00029	Surface Impoundment	
> 340 million to 34 billion ft^2 > 7,800 to 780,000 acres	> 34 billion ft^2 > 780,000 acres	ft^2 ÷ 34,000 acres ÷ 0.78	Contaminated Soil	
> 130,000 to 13 million ft^2 > 2.9 to 290 acres	> 13 million ft^2 > 290 acres	ft^2 ÷ 13 acres ÷ 0.00029	Pile	
>2.7 million to 270 million ft^2 >62 to 6,200 acres	> 270 million ft^2 > 6,200 acres	ft^2 ÷ 270 acres ÷ 0.0062	Land Treatment	

HAZARDOUS WASTE QUANTITY (HWQ) CALCULATION

For each migration pathway, evaluate HWQ associated with sources that are available (i.e., incompletely contained) to migrate to that pathway. (Note: If *Actual Contamination Targets* exist for ground water, surface water, or air migration pathways, assign the calculated HWQ score or 100, whichever is greater, as the HWQ score for that pathway.) For each source, evaluate HWQ for one or more of the four tiers (SI Table 1; HRS Table 2-5) for which data exist: constituent quantity, wastestream quantity, source volume, and source area. Select the tier that gives the highest value as the source HWQ. Select the source volume HWQ rather than source area HWQ if data for both tiers are available.

Column 1 of SI Table 1 indicates the quantity tier. Column 2 lists source types for the four tiers. Columns 3, 4, 5, and 6 provide ranges of waste amount for sites with only one source, corresponding to HWQ scores at the tops of the columns. Column 7 provides formulas to obtain source waste quantity values at sites with multiple sources.

1. Identify each source type.
2. Examine all waste quantity data available for each source. Record constituent quantity and waste stream mass or volume. Record dimensions of each source.
3. Convert source measurements to appropriate units for each tier to be evaluated.
4. For each source, use the formulas in the last column of SI Table 1 to determine the waste quantity value for each tier that can be evaluated. Use the waste quantity value obtained from the highest tier as the quantity value for the source.
5. Sum the values assigned to each source to determine the total site waste quantity.
6. Assign HWQ score from SI Table 2 (HRS Table 2-6).

Note these exceptions to evaluate soil exposure pathway HWQ (see HRS Table 5-2):

- The divisor for the area (square feet) of a landfill is 34,000.
- The divisor for the area (square feet) of a pile is 34.
- Wet surface impoundments and tanks and non-drum containers are the only sources for which volume measurements are evaluated for the soil exposure pathway.

SI TABLE 2: HWQ SCORES FOR SITES

Site WQ Total	HWQ Score
0	0
1[a] to 100	1[b]
> 100 to 10,000	100
> 10,000 to 1 million	10,000
> 1 million	1,000,000

a If the WQ total is between 0 and 1, round it to 1.
b If the hazardous constituent quantity data are not complete, assign the score of 10.

COPY

Bristol Company
CERCLIS NO: CTD981898406
August 13, 1993

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: Bristol Company

References 1, 38, 39, 40, 60

Sources:

1. Transformer leakage (soil/gw)
2. Former waste oil UST/storage area
3. Former waste storage area
4. Stained sediment area
5. Former PCE tank
6. Former waste storage area
7. Eastern courtyard storage tanks (soil/gw)
8. Former baghouse
9.

SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY		SURFACE WATER PATHWAY: OVERLAND/FLOOD MIGRATION							GROUND WATER TO SURFACE WATER				Air Tox/ Mobility
			GW Mobility (HRS Table 3-8)	Tox/ Mobility Value (HRS Table 3-9)	Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (HRS Table 4-12)	Bioac Pot (HRS Table 4-15)	Tox/ Pers/ Bioac Value (HRS Table 4-16)	Ecotox (HRS Table 4-19)	Ecotox/ Pers (HRS Table 4-20)	Ecotox/ Pers/ Bioacc Value (HRS Table 4-21)	Tox/ Mobi/ Pers Value (HRS Table 4-26)	Tox/ Mobi/ Pers/ Bioacc Value (HRS Table 4-28)	Ecotox/ Mobi/ Pers Value (HRS Table 4-29)	Ecotox/ Mobi/ Pers/ Bioacc Value (HRS Table 4-30)	
1,2,5	Acetone ✓	10^1	1	10^1	4×10^{-1}	4	5×10^{-1}	2	10^2	4×10^1	2×10^1	4	2	40	20	10
1	Endosulfan Sulfate ✓	10^2	10^{-2}	1	1	10^2	5×10^1	5×10^3	NA	NA	NA	1	5×10^1	NA	NA	10^2
1,2,3,4,6	Potassium ✓	N/A														
2,4,8	Trichloroethene	10^1	10^{-2}	10^{-1}	4×10^{-1}	4	5×10^1	2×10^3	10^2	4×10^1	2×10^2	4×10^{-2}	2	4×10^{-1}	2×10^1	10
2,4,8	Mercury ✓	10^4	1	10^4	1	10^4	5×10^4	5×10^8	10^4	10^4	5×10^8	10^4	5×10^8	10^4	5×10^8	2×10^3
1,3	1,1 Dichloroethene	10^2	1	10	4×10^{-1}	4	5	2×10^1	NA	NA	NA	4	2×10^1	NA	NA	10^2
2	1,1 Dichloroethene	10^2	10^{-2}	1	4×10^{-1}	4×10^1	5×10^1	2×10^3	10	4	2×10^2	4×10^{-1}	2	4×10^{-2}	2	10
2,3	1,2-Dichloroethane	10^2	1	10^2	4×10^{-1}	4×10^1	5×10^1	2×10^3	10	4×10^1	2×10^2	4×10^{-1}	2×10^2	4×10^{-1}	2	10^2
1,2,3	1,1,1-TCA ✓	10^1	10^{-2}	10^{-1}	4×10^{-1}	4	5	2×10^1	10^1	4	2×10^1	4×10^{-2}	2×10^{-1}	4×10^{-2}	2×10^{-1}	10
1,7	Naphthalene ✓	10^3	10^{-2}	10^1	4×10^1	4×10^2	5×10^2	2×10^5	10^3	4×10^2	2×10^3	4	2×10^3	4	2×10^2	2×10^1
2	1,2-TCA ✓	10^3	10^{-2}	10^1	4×10^{-1}	4×10^2	5×10^1	2×10^4	10	4	2×10^2	4	2×10^2	4×10^{-2}	2	10^3
2,3	PCE ✓	10^3	10^{-2}	1	4×10^{-1}	4×10^1	5×10^1	2×10^3	10^2	4×10^1	2×10^5	4×10^{-1}	2×10^1	1	5×10^1	10^2
2	Fluoranthene	NOT LISTED														
8	Pyrene	10^2	10^{-4}	10^{-2}	1	10^2	5×10^1	5×10^3	—	—	—	10^{-2}	5×10^{-1}	—	—	2×10^{-1}

C-11(a)

(11)

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: Bristol Company

References 1, 38, 39, 40, 602

Sources:

1. Transformer leakage
2. Former waste oil UST/storage area
3. Former waste storage area
4. Stained sediment area
5. Former RE tanks
6. Former waste storage area
7. Eastern courtyard storage tanks
8.
9.

SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY		SURFACE WATER PATHWAY: OVERLAND/FLOOD MIGRATION							GROUND WATER TO SURFACE WATER				Air Toxicity/ Mobility
			GW Mobility (HRS Table 3-8)	Tox/ Mobility Value (HRS Table 3-9)	Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (HRS Table 4-12)	Bioac Pot. (HRS Table 4-15)	Tox/ Pers/ Bioac Value (HRS Table 4-16)	Ecotox (HRS Table 4-19)	Ecotox/ Pers (HRS Table 4-20)	Ecotox/ Pers/ Bioacc Value (HRS Table 4-21)	Tox/ Mobil Pers Value (HRS Table 4-26)	Tox/ Mobil Pers/ Bioacc Value (HRS Table 4-28)	Ecotox/ Mobil Pers Value (HRS Table 4-29)	Ecotox/ Mobil Pers/ Bioacc Value (HRS Table 4-30)	
2	Chrysene	NA	10^{-4}	NA	1	NA	5×10^{2}	NA								NA
2,3,4	Aroclor 1254	10^{4}	10^{-4}	1	1	10^{4}	5×10^{4}	5×10^{8}	10^{4}	10^{4}	5×10^{8}	1	5×10^{4}	1	5×10^{4}	10^{4}
2	Calcium	N/A														
2,3	Copper	NA	10^{-2}	NA	1	NA	5×10^{4}	NA	10^{2}	10^{2}	5×10^{6}	NA	NA	1	5×10^{4}	NA
1,3,6	Cadmium	10^{4}	1	10^{4}	1	10^{4}	5×10^{3}	5×10^{7}	10^{3}	10^{3}	5×10^{6}	10^{4}	5×10^{3}	10^{3}	5×10^{6}	NA
2	Nickel	10^{4}	10^{-2}	10^{2}	1	10^{4}	5×10^{1}	5×10^{3}	10^{1}	10^{1}	5×10^{3}	10^{2}	5×10^{1}	1×10^{-1}	5×10^{1}	NA
4	Chromium	10^{4}	10^{-2}	10^{2}	1	10^{4}	5	5×10^{4}	10^{4}	10^{4}	5×10^{4}	10^{2}	5×10^{2}	10^{2}	5×10^{2}	NA
6	Lead	10^{4}	10^{-2}	10^{2}	1	10^{4}	5×10^{1}	5×10^{5}	10^{2}	10^{3}	5×10^{4}	10^{2}	5×10^{3}	10^{1}	5×10^{2}	NA
3,7	Zinc	10^{1}	10^{-2}	10^{-1}	1	10^{1}	5×10^{2}	5×10^{3}	10^{1}	10^{1}	5×10^{0}	10^{-1}	5×10^{1}	10^{-1}	5×10^{1}	NA
1,7	Methylnaphthalene	NA	1	NA	.4	NA	5×10^{3}	NA	10^{3}	400	2×10^{6}	NA	→	900	2×10^{6}	NA
1	Flourene	10^{2}	10^{-2}	1	1	10^{2}	5×10^{3}	5×10^{5}	10^{3}	10^{3}	5×10^{6}	.1	5×10^{3}	10^{3}	5×10^{6}	2×10^{1}
7	Phenanthrene	NA	10^{-4}	NA	4×10^{1}	NA	5×10^{1}	NA	10^{3}	4×10^{2}	2×10^{6}	NA	NA	.04	2	NA
7	Arsenic	10^{4}	10^{-2}	10^{2}	1	10^{4}	5	5×10^{4}	10	10	5×10^{2}	10^{2}	5×10^{-2}	10^{-1}	5	NA
7	Cyanide	10^{2}	NA	NA	4×10^{-1}	NA	5×10^{-1}	NA	5×10^{-1}	2×10^{2}	1×10^{-1}	NA	NA	NA	NA	NA

SI TABLE 4: GROUND WATER OBSERVED RELEASE SUBSTANCES (BY AQUIFER)

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Mobility	References
GW-01,02,04	1,1 dichloroethane	10 ug/L V	10	38, 39, 40, 62
GW-01,02	1,1,1 - TCA	4.0 ug/L V	10^{-1}	
GW-01,02	TCE	180 ug/L V	10^{-1}	
GW-01,02	Naphthalene	10 ug/L V	10	
GW-01,02	Cadmium	1.4 mg/L	10 4	
GW-01,02,04	2-methylnaphthalene	10 ug/L V	N/A	
GW-04	Flouridon	10 ug/L V	1	
GW-02	Acetone	10 ug/L V	10	
GW-04	1,2-dichloroethane	10 ug/L V	10^2	
(continued)		Highest Toxicity/Mobility	Continued	

SI TABLE 5: GROUND WATER ACTUAL CONTAMINATION TARGETS

No known actual contamination targets sampled

Well ID: _____ Level I ____ Level II ____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Well ID: _____ Level I ____ Level II ____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

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SI TABLE 4: GROUND WATER OBSERVED RELEASE SUBSTANCES (BY AQUIFER)

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Mobility	References
GW-04	Phenanthrene	10 ug/L U	NA	38, 39, 40, 62
GW-04	Arsenic	2.0 ug/L	10^{-2}	↓
GW-04	Zinc	~190 ug/L	10^{-1}	↓
GW-04	Mercury	0.1 ug/L	10^{-4}	↓
GW-04	Cyanide	10.0 ug/L	NA	↓
GW-04	Aroclor 1254	1.1 ug/L U	1	
		Highest Toxicity/Mobility	10⁻¹	

SI TABLE 5: GROUND WATER ACTUAL CONTAMINATION TARGETS

No known actual contamination targets sampled

Well ID: _____ Level I ____ Level II ____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Well ID: _____ Level I ____ Level II ____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

C-13(b)

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GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe Ground Water Use within 4 Miles of the Site:
Describe generalized stratigraphy, aquifers, municipal and private wells

The Bristol property is underlain by the Waterbury Gneiss Formation, consisting of fine to medium grained schist and gneiss [41]. Depth to bedrock is estimated to be greater than 15 feet based on observations of the absence of bedrock outcrops on and around the site and regional topography [2,41]. There are no known bedrock faults within one mile of the property [41].

Surficial deposits on the eastern third of the property are mapped as alluvium, derived from the Naugatuck River, overlying undifferentiated sands and gravel. The alluvium consists primarily of silt, sand and gravel. These surficial deposits may be as much as 25 feet thick along the Naugatuck River [42]. However, because of the site's distance from the river, a thinner surficial deposit layer is anticipated. Surficial deposits on the western two-thirds of the property are mapped as well to poorly sorted alternating layers of sand and gravel [42]. Given the site's long industrial history, the presence of fill on the property is possible [2].

Soil beneath the Bristol site is mapped as part of the Agawam-Merrimac-Hinckley Series, deep, well drained to excessively well drained soils with a sandy and gravelly substratum, on terraces [43]. Net precipitation in the area is estimated as 20 inches per year, including the effects of lake evaporation [44].

According to the CT DEP, groundwater beneath the site is classified as "GA". Groundwater with this classification is within the area of influence of private and public wells and is presumed suitable for direct human consumption without the need for treatment. The State's goal is to maintain drinking water quality [45,46]. Based on groundwater level measurements taken by WESTON/ARCS from three existing on-site monitoring wells, groundwater depth ranges from approximately three to nine feet below the ground surface [2]. Observations of local topography and drainage suggest that groundwater flow beneath the property is toward the east and the Naugatuck River [2].

(continued)

Show Calculations of Ground Water Drinking Water Populations for each Aquifer:
Provide apportionment calculations for blended supply systems.
County average number of persons per household: _____ Reference _____

Private well user populations were determined through conversations with the Waterbury Water Bureau and the Connecticut Water Company, and by apportioning U.S. Census town population data and the estimated percent of private well users for each town within four miles of the site by radial distance ring. Populations using public well water within each radial distance ring were obtained from the CT DEP "Atlas of Public Water Supply Sources and Drainage Basins in Connecticut" and the Community Water Systems in CT map and the CT Department of Health Services (DHS) public well user database [6,7,47,48,49,50,60].

COPY

GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe Ground Water Use within 4 Miles of the Site:
Describe generalized stratigraphy, aquifers, municipal and private wells

The Bristol property and the surrounding area are provided with public water service from the Connecticut Water Company, Naugatuck Division. Approximately 99 percent of the City of Waterbury receives its water supply from a series of surface reservoirs approximately eight miles north of the site [12,47]. The nearest private well to the site is located approximately one-third of a mile to the southwest [6]. The nearest public well is located approximately 2.2 miles southwest in Naugatuck, CT [7]. An estimated 9,615 and 3,679 persons are served by private and public water supplies within four miles of the property, respectively [6,7,12,45,46,48,49,50]. There are no wellhead protection areas in the Bristol vicinity. Two Marks Brook public wells, operated by the Connecticut Water Company-Naugatuck Division, are reportedly blended with a series of surface water supplies operated by the same company. The wells are located approximately 3.2 miles southeast of the Bristol Site in Naugatuck, and contribute approximately 25 percent (1,750 people) of the total supply. According to the site contact, Bristol used a production well located on the south end of the property for process water. No information regarding the period of usage, production rates or water quality was available [2].

(continued)

Show Calculations of Ground Water Drinking Water Populations for each Aquifer:
Provide apportionment calculations for blended supply systems.
County average number of persons per household: _____ Reference _____

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GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe Ground Water Use within 4 Miles of the Site:
Describe generalized stratigraphy, aquifers, municipal and private wells

Estimated Drinking Water Populations Served by Groundwater Sources Within Four Miles of the Bristol Company

Radial Distance From M S Chambers (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within Ring
0.00 < 0.25	0	0	0
0.25 < 0.50	153	0	153
0.50 < 1.00	451	0	451
1.00 < 2.00	1,808	0	1,808
2.00 < 3.00	3,010	1,259	4,269
3.00 < 4.00	4,193	2,420	6,613
TOTALS	9,615	3,679	13,294

[6,7,12,47,48,49,50,60]

Show Calculations of Ground Water Drinking Water Populations for each Aquifer:
Provide apportionment calculations for blended supply systems.
County average number of persons per household: _____ Reference _____

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GROUND WATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.	550	H	39, 39 40
2. POTENTIAL TO RELEASE: Depth to aquifer: _____ feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.			
LR =	550		

TARGETS			
Are any wells part of a blended system? Yes ___ No X If yes, attach a page to show apportionment calculations.			
3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ Total =	0	E	47-50
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	166	E	6,12 47
5. NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	18	E	6,12 47
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a ground water observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles; otherwise assign 0.	0	E	12
7. RESOURCES: Assign a score of 5 if one or more ground water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area, excluding drinking water use	5	E	2
Sum of Targets T=	189		

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS

SI Table 6a: Other Than Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile	0	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	0	6,12 47
> $\frac{1}{4}$ to $\frac{1}{2}$ mile	153	18	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122	102	
> $\frac{1}{2}$ to 1 mile	451	9	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385	167	
> 1 to 2 miles	1,808	5	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842	294	
> 2 to 3 miles	4,269	3	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219	678	
>3 to 4 miles	6,613	2	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596	417	

Nearest Well = 18

Sum = 1,658

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SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS (continued)

SI Table 6b: Karst Aquifers (N/A)

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category: 1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000	Pop. Value	Ref.
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455		
$>\frac{1}{4}$ to $\frac{1}{2}$ mile		20	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122		
$>\frac{1}{2}$ to 1 mile		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 1 to 2 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 2 to 3 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 3 to 4 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		

Nearest Well = [ ] Sum = [ ]

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GROUND WATER PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS	Score	Data Type	Does not Apply
8. If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to ground water.	10 4	E	
9. Assign the highest ground water toxicity/mobility value from SI Table 3 or 4.	10 4	H	
10. Multiply the ground water toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7)	100	H	
WC =	100		

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the ground water pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

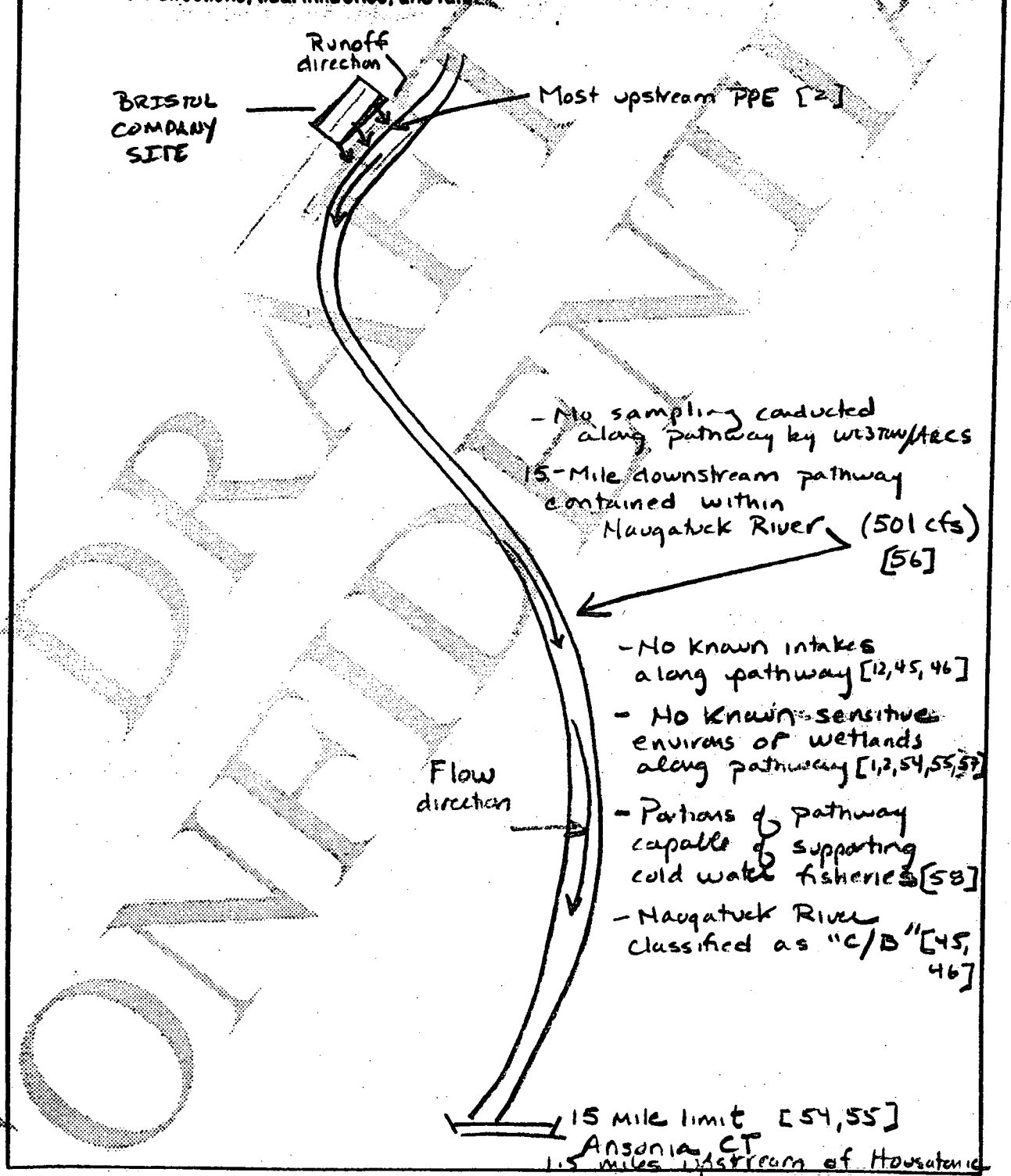
GROUND WATER PATHWAY SCORE: $\frac{LR \times T \times WC}{82,500}$ = 100 (Maximum of 100)

$$\frac{550 \times 189 \times 100}{82,500} = 1263$$

COPY

SURFACE WATER PATHWAY

Sketch of the Surface Water Migration Route:
Label all surface water bodies. Include runoff route and drainage direction, probable point of entry, and 15-mile target distance limit. Mark sample locations, intakes, fisheries, and sensitive environments. Indicate flow directions, tidal influence, and rate.



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SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

No WESTON/ARCS surface water samples collected. NPDES discharge monitoring reports used.

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Persistence	Toxicity/ Persis./ Bioaccum	Ecotoxicity/ Persis/ Ecobioaccum	References
	Cadmium ✓	0	10^4	5×10^7	5×10^6	19-20, 68
	Copper ✓		NA	NA	5×10^6	
	Nickel ✓		10^4	5×10^3	5×10^2	
	Zinc ✓		10^1	5×10^3	5×10^3	
	Phenols		1	5	5×10^4	✓
	Chloroform ✓		40	2×10^2	2×10^1	✓
	Dichlorobromomethane ✓		NA		>	✓
	1,1,1-TCA ✓		4	2×10^1	2×10^1	✓
	TCE ✓		4	2×10^2	2×10^3	✓
	Cyanide ✓		40	2×10^1	3×10^2	✓
		Highest Values	10^4	5×10^7	5×10^6	

SI TABLE 8: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

No known surface water intakes along 15-mile downstream pathway.

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

(96)

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET

LIKELIHOOD OF RELEASE- OVERLAND/FLOOD MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7. *	550	E/H	14-18
2. POTENTIAL TO RELEASE: Distance to surface water: ____(feet) If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on distance to surface water and flood frequency.			

Distance to surface water <2500 feet	500
Distance to surface water >2500 feet, and:	
Site in annual or 10-yr floodplain	500
Site in 100-yr floodplain	400
Site in 500-yr floodplain	300
Site outside 500-yr floodplain	100

Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2

* Scored based on known former NPDES discharge

LR = 550

LIKELIHOOD OF RELEASE GROUND WATER TO SURFACE WATER MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.		H	19
NOTE: Evaluate ground water to surface water migration only for a surface water body that meets all of the following conditions:			
1) A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0.			
2) No aquifer discontinuity is established between the source and the above portion of the surface water body.			
3) The top of the uppermost aquifer is at or above the bottom of the surface water.			
Elevation of top of uppermost aquifer _____			
Elevation of bottom of surface water body _____			
2. POTENTIAL TO RELEASE: Use the ground water potential to release. Optionally, evaluate surface water potential to release according to HRS Section 3.1.2.			

LR =

SURFACE WATER PATHWAY

LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET (CONTINUED)

DRINKING WATER THREAT TARGETS	Score	Data Type	Refs
Record the water body type, flow, and number of people served by each drinking water intake within the target distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign 0 to factors 3, 4, and 5. Intake Name / Water Body Type / Flow / People Served: None Are any intakes part of a blended system? Yes _____ No X If yes, attach a page to show apportionment calculations. None along downstream pathway. 3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8). Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ Total =	0	E	6,45-46,60
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.	0	E	6,45-46,60
5. NEAREST INTAKE: Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign 0.	0	E	6,45-46,60
6. RESOURCES: Assign a score of 5 if one or more surface water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major or designated water recreation area, excluding drinking water use (Conservative estimate)	5	E	2
SUM OF TARGETS T=	5		

50

SI TABLE 9 (From HRS Table 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY

No drinking water intakes along downstream pathway

Type of Surface Water Body	Pop.	Nearest intake	Number of people									Pop. Value
			0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (<10 cfs)		20	0	4	17	53	164	522	1,633	5,214	16,325	
Small to moderate stream (10 to 100 cfs)		2	0	0.4	2	5	16	52	163	521	1,633	
Moderate to large stream (> 100 to 1,000 cfs)		0	0	0.04	0.2	0.5	2	5	16	52	163	
Large Stream to river (>1,000 to 10,000 cfs)		0	0	0.004	0.02	0.05	0.2	0.5	2	5	16	
Large River (> 10,000 to 100,000 cfs)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	16	
Very Large River (>100,000 cfs)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Shallow ocean zone or Great Lake (depth < 20 feet)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Deep ocean zone or Great Lake (depth > 200 feet)		0	0	0	0	0	0.001	0.003	0.008	0.03	0.08	
3-mile mixing zone in quiet flowing river (≥ 10 cfs)		10	0	2	9	26	82	261	817	2,607	8,163	
		Nearest intake =	0								Sum =	0

References 6, 45, 46-60

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SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Fishery ID: Naugatuck River Sample Type Aqueous/NPDES discharge Level I ✓ Level II ✓ References 18, 60

Sample ID	Hazardous Substance	mg/L Conc. ~~(mg/kg)~~	Benchmark Concentration (FDAAL)	% of Benchmark	Cancer Risk Concentration.	% of Cancer Risk Concentration	(mg/kg) RfD	% of RfD
NPDES discharge monitoring report	Cadmium	0.04	NA	NA	NA	NA	1.3	3.1
	Copper	0.09	NA	NA	NA	NA	NA	NA
	Nickel	0.23	NA	NA	NA	NA	260	0.9
	Zinc	0.05	NA	NA	NA	NA	390	0.01
	Phenols (ug/L)	0.034	NA	NA	NA	NA	700	0.004
	(continued)		Highest Percent	NA	Sum of Percents	NA	Sum of Percents	continued

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

No known sensitive environments along 15+ mile downstream pathway.

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

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SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Fishery ID: Naugatuck River Sample Type Aqueous/NPDES discharge Level I ✓ Level II ✓ References 18, 62

Sample ID	Hazardous Substance	~~mg/L~~ ug/L Conc. (~~mg/kg~~)	Benchmark Concentration (FDAAL)	% of Benchmark	(ug/kg) Cancer Risk Concentration.	% of Cancer Risk Concentration	RfD	% of RfD
NPDES	Chloroform	40	NA	NA	210	19	13000	0.31
discharge	Dichlorobromomethane	4	NA	NA	NA	NA	NA	NA
monitoring	1,1,1-TCA	6	NA	NA	NA	NA	1200000	0.005
report	TCE	100	NA	NA	120	83	NA	NA
	Cyanide	0.02	NA	NA	NA	NA	260,000	0.0
			Highest Percent	NA	Sum of Percents	102	Sum of Percents	0.33

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

No known sensitive environments along 15-mile downstream pathway.

Sample ID	Hazardous Substance	Conc.. (ug/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (ug/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

C-27(b)

(31)

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SURFACE WATER PATHWAY (continued)
HUMAN FOOD CHAIN THREAT WORKSHEET

HUMAN FOOD CHAIN THREAT TARGETS	Score	Data Type	Refs
Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.			
Fishery Name ___ Water Body Naugatuck Flow ~500 cfs Cold water species River Species Unknown Production Unknown lbs/yr Species ___ Production ___ lbs/yr Fishery Name ___ Water Body ___ Flow ___ cfs Species ___ Production ___ lbs/yr Species ___ Production ___ lbs/yr Fishery Name ___ Water Body ___ Flow ___ cfs Species ___ Production ___ lbs/yr Species ___ Production ___ lbs/yr		E	2,56
FOOD CHAIN INDIVIDUAL 7. ACTUAL CONTAMINATION FISHERIES: If analytical evidence indicates that a fishery has been exposed to a hazardous substance with a bioaccumulation factor greater than or equal to 500 (SI Table 10), assign a score of 50 if there is a Level I fishery. Assign 45 if there is a Level II fishery, but no Level I fishery. Cadmium bioaccumulation – 5,000 8. POTENTIAL CONTAMINATION FISHERIES: If there is a release of a substance with a bioaccumulation factor greater than or equal to 500 to a watershed containing fisheries within the target distance limit, but there are no Level I or Level II fisheries, assign a score of 20. If there is no observed release to the watershed, assign a value for potential contamination fisheries from the table below using the lowest flow at all fisheries within the target distance limit:			
FCI Value =	50	H	62

Lowest Flow	FCI Value
<10 cfs	20
10 to 100 cfs	2
>100 cfs, coastal tidal waters, oceans, or Great Lakes	0
3-mile mixing zone in quiet flowing river	10

SUM OF TARGETS T = 50

32

SURFACE WATER PATHWAY (continued)
ENVIRONMENTAL THREAT WORKSHEET

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value for each type.

ENVIRONMENTAL THREAT TARGETS	Score	Data Type	Refs

Record the water body type and flow for each surface water sensitive environment within the target distance (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page. No sensitive environs

Environment Name	Water Body Type	Flow
		____cfs
		____cfs
		____cfs
		____cfs
		____cfs

9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14).

Environment Name	Environment Type and Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)	Product
		x =	
		x =	
		x =	
		x =	
		Sum =	

Data Type: E
Refs: 1, 54, 55, 57

10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:

Flow	Dilution Weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.	Product
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
			Sum =	

T = 0

SI TABLE 12 (HRS Table 4-13): SURFACE WATER DILUTION WEIGHTS

Type of Surface Water Body		Assigned Dilution Weight
Descriptor	Flow Characteristics	
Minimal stream	< 10 cfs	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	> 100 to 1,000 cfs	0.01
Large stream to river	> 1,000 to 10,000 cfs	0.001
Large river	> 10,000 to 100,000 cfs	0.0001
Very large river	> 100,000 cfs	0.00001
Coastal tidal waters	Flow not applicable; depth not applicable	0.0001
Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.0001
Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.00001
Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

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SI TABLE 13 (HRS TABLE 4-23): SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS VALUES

SENSITIVE ENVIRONMENT	ASSIGNED VALUE
Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
State designated areas for the protection of maintenance of aquatic life under the Clean Water Act	5
Wetlands — See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

SI TABLE 14 (HRS TABLE 4-24): SURFACE WATER WETLANDS FRONTAGE VALUES

Total Length of Wetlands	Assigned Value
Less than 0.1 mile	0
0.1 to 1 mile	25
Greater than 1 to 2 miles	50
Greater than 2 to 3 miles	75
Greater than 3 to 4 miles	100
Greater than 4 to 8 miles	150
Greater than 8 to 12 miles	250
Greater than 12 to 16 miles	350
Greater than 16 to 20 miles	450
Greater than 20 miles	500

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SURFACE WATER PATHWAY (concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS

	Score
~~14.~~ 11 If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater.	10,000
~~15.~~ 12. Assign the highest value from SI Table 7 (observed release) or SI Table 3 (no observed release) for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.	

	Substance Value		HWQ		Product	WC Score (from Table) (Maximum of ~~100~~ 1000)
Drinking Water Threat Toxicity/Persistence	10^4	x	10^4	=	10^8	100
Food Chain Threat Toxicity/Persistence Bioaccumulation	5×10^8	x	10^4	=	5×10^{12}	1,000
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	5×10^8	x	10^4	=	5×10^{12}	1,000

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 to <1E + 09	100
1E + 09 to <1E + 10	180
1E + 10 to <1E + 11	320
1E + 11 to <1E + 12	560
1E + 12 or greater	1000

SURFACE WATER PATHWAY THREAT SCORES

Threat	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$
Drinking Water	550	5	100	(maximum of 100) 3.3
Human Food Chain	550	50	1,000	(maximum of 100) 100
Environmental	550	0	1,000	(maximum of 60) 0

SURFACE WATER PATHWAY SCORE (Drinking Water Threat + Human Food Chain Threat + Environmental Threat)	(maximum of 100) 100

SOIL EXPOSURE PATHWAY

If there is no observed contamination (e.g., ground water plume with no known surface source), do not evaluate the soil exposure pathway. Discuss evidence for no soil exposure pathway.

Soil Exposure Resident Population Targets Summary

For each property (duplicate page 35 as necessary):

If there is an area of observed contamination on the property and within 200 feet of a residence, school, or day care center, enter on Table 15 each hazardous substance by sample ID. Record the detected concentration. Obtain cancer risk, and reference dose concentrations from SCDM. Sum the cancer risk and reference dose percentages for the substances listed. If cancer risk or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the residents and students as Level I. If both percentages are less than 100% or all are N/A, evaluate the targets as Level II.

RESIDENT POPULATION NOT EVALUATED

No off-site soil samples were collected during the WESTON/ARCS sampling event. On-site soil samples collected on the west side of the Bristol site, approximately 200 feet east of a residential area and day-care center, indicated contamination with several volatile and semi-volatile organic compounds, metals, and the PCB Aroclor 1254. However, because these samples were collected from beneath a contiguous layer of asphalt, and the western side of the site is paved, the potential for exposure to soil contaminants is limited. In addition, the entire Bristol site is surrounded by a six-foot chain linked fence, further limiting access. [2]

The reference sample (SS-09) was collected from an undisturbed wooded area between the developed western part of the property and the off-site residential area to the west. Analytical results from the reference sample indicate the presence of one volatile organic compound (1,2-dichloroethane [4.0 ug/kg J]), also found on formerly active portions of the site, several semivolatile organic compounds, metals and two pesticides. All compound concentrations were estimated (J). Compound and element concentrations detected in sample SS-09 were generally lower than in the source samples. [38, 39, 40].

The migration of any subsurface contamination on the western side of the property to the adjacent residential area, appeared unlikely. Observations of site and area topography indicate that groundwater flow direction is toward the east, away from the residential area. The transport of soil-contaminants via airborne dust is also unlikely. Most of the subject property is paved or occupied by buildings. A narrow wooded area is located on the western end of the property between the residential areas and the property's manufacturing buildings. No exposed soil was observed in this area. The area was heavily vegetated and the ground was covered with vegetation and leaves [2].

SI TABLE 15: SOIL EXPOSURE RESIDENT POPULATION TARGETS No off-site samples collected

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Sum of Highest Percents		Sum of Percents		Sum of Percents	

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Sum of Highest Percents		Sum of Percents		Sum of Percents	

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Sum of Highest Percents		Sum of Percents		Sum of Percents	

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SOIL EXPOSURE PATHWAY WORKSHEET
RESIDENT POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Type	Refs
1. OBSERVED CONTAMINATION: If evidence indicates presence of observed contamination (depth of 2 feet or less), assign a score of 550; otherwise, assign a 0. Note that a likelihood of exposure score of 0 results in a soil exposure pathway score of 0.	0	E	2
LE =	0		

TARGETS			
2. RESIDENT POPULATION: Determine the number of people occupying residences or attending school or day care on or within 200 feet of areas of observed contamination (HRS section 5.1.3). Level I: ____ people x 10 = ____ Level II: ____ people x 1 = ____ Sum =	0	E	2
3. RESIDENT INDIVIDUAL: Assign a score of 50 if any Level I resident population exists. Assign a score of 45 if there are Level II targets but no Level I targets. If no resident population exists (*i.e.*, no Level I or Level II targets), assign 0 (HRS Section 5.1.3).	0	E	2
4. WORKERS: Assign a score from the table below for the total number of workers at the site and nearby facilities with areas of observed contamination associated with the site.	0	E	2
5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Assign a value for each terrestrial sensitive environment (SI Table 16) in an area of observed contamination. Sum =	0	E	2, 5
6. RESOURCES: Assign a score of 5 if any one or more of the following resources is present on an area of observed contamination at the site; assign 0 if none applies. • Commercial agriculture • Commercial silviculture • Commercial livestock production or commercial livestock grazing	0	E	2
Total of Targets T=	0		

Number of Workers	Score
0	0
1 to 100	5
101 to 1,000	10
>1,000	15

Terrestrial Sensitive Environment Type	Value

4D

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SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

TERRESTRIAL SENSITIVE ENVIRONMENT	ASSIGNED VALUE
Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

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SOIL EXPOSURE PATHWAY WORKSHEET
NEARBY POPULATION THREAT

LIKELIHOOD OF EXPOSURE		Score	Data Type	Ref.
7. Attractiveness/Accessibility (from SI Table 17 or HRS Table 5-6)	Value 5			
Area of Contamination (from SI Table 18 or HRS Table 5-7)	Value 20		E	2
Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)		5		
	LE =	5		

TARGETS	Score	Data Type	Ref.
8. Assign a score of 0 if Level I or Level II resident individual has been evaluated or if no individuals live within 1.4 mile travel distance of an area of observed contamination. Assign a score of 1 if nearby population is within 1/4 mile travel distance and no Level I or Level II resident population has been evaluated.	1	E	2,59
9. Determine the population within 1 mile travel distance that is not exposed to a hazardous substance from the site (*i.e.*, properties that are not determined to be Level I or Level II); record the population for each distance category in SI Table 20 (HRS Table 5-10). Sum the population values and multiply by 0.1.	6.6	E	2,59
T =	7.6		

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SI TABLE 17 (HRS TABLE 5-6): ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of Observed Contamination	Assigned Value
Designated recreational area	100
Regularly used for public recreation (for example, vacant lots in urban area)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements--for example, gravel road) with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
Accessible with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned Value
≤ to 5,000	5
> 5,000 to 125,000	20
> 125,000 to 250,000	40
> 250,000 to 375,000	60
> 375,000 to 500,000	80
> 500,000	100

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SI TABLE 19 (HRS TABLE 5-8): NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

AREA OF CONTAMINATION FACTOR VALUE	ATTRACTIVENESS/ACCESSIBILITY FACTOR VALUE						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

SI TABLE 20 (HRS TABLE 5-10): DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT

Travel Distance Category (miles)	Pop.	Number of people within the travel distance category												Pop. Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	
Greater than 0 to $\frac{1}{4}$	399	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034	13
Greater than $\frac{1}{4}$ to $\frac{1}{2}$	1,198	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	20
Greater than $\frac{1}{2}$ to 1	4,630	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258	33
													Sum =	66

Reference(s) 2,59

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SOIL EXPOSURE PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS

10.	Assign the hazardous waste quantity score calculated for soil exposure	10⁴
11.	Assign the highest toxicity value from SI Table ~~16~~ 15. (3)	10⁴
12.	Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 10⁴

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1; Targets = Sum of Questions 2, 3, 4, 5, 6)

$$\frac{LE \times T \times WC}{82,500}$$

0

NEARBY POPULATION THREAT SCORE:

5 × 7,6 = 100

(Likelihood of Exposure, Question 7; Targets = Sum of Questions 8, 9)

$$\frac{LE \times T \times WC}{82,500}$$

0.05

SOIL EXPOSURE PATHWAY SCORE:
Resident Population Threat + Nearby Population Threat

0
(Maximum of 100)

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SI TABLE 21: AIR PATHWAY OBSERVED RELEASE SUBSTANCES

- No air monitoring data available
- No known air monitoring conducted on-site.

Sample ID: _____ Level I ____ Level II ____ Distance from Sources (mi) ____ References _____

Hazardous Substance	Conc. (µg/m³)	~~Toxicity/ Mobility~~ ~~Gaseous~~ ~~Particulate~~	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Sample ID: _____ Level I ____ Level II ____ Distance from Sources (mi) ____ References _____

Hazardous Substance	Conc. (µg/m³)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Sample ID: _____ Level I ____ Level II ____ Distance from Sources (mi) ____ References _____

Hazardous Substance	Conc. (µg/m³)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

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AIR PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to air, assign a score of 550. Record observed release substances on SI Table 21.			
2. POTENTIAL TO RELEASE: If sampling data do not support a release to air, assign a score of 500. Optionally, evaluate air migration gaseous and particulate potential to release (HRS Section 6.1.2).	500	E	2
LR =	500		

TARGETS	Score	Data Type	Refs
3. ACTUAL CONTAMINATION POPULATION: Determine the number of people within the target distance limit subject to exposure from a release of a hazardous substance to the air. a) Level I: ____ people x 10 = ____ b) Level II: ____ people x 1 = ____ Total =	0	—	—
4. POTENTIAL TARGET POPULATION: Determine the number of people within the target distance limit not subject to exposure from a release of a hazardous substance to the air, and assign the total population score from SI Table 22. Sum the values and multiply the sum by 0.1.	57.8	E	2,59
5. NEAREST INDIVIDUAL: Assign a score of 50 if there are any Level I targets. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Population exists, assign the Nearest Individual score from SI Table 22.	20	E	2
6. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (SI Table 13) and wetland acreage values (SI Table 23) for environments subject to exposure from the release of a hazardous substance to the air.	0	—	—
7. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS: Use SI Table 24 to evaluate sensitive environments not subject to exposure from a release.	0,037	E	1,2,54 55,57
8. RESOURCES: Assign a score of 5 if one or more air resources apply within 1/2 mile of a source; assign a 0 if none applies. • Commercial agriculture • Commercial silviculture • Major or designated recreation area	5	E	2
T =	83		

Sensitive Environment Type	Value
None	

Wetland Acreage	Value

(47)

SI TABLE 22 (From HRS TABLE 6-17): VALUES FOR POTENTIAL CONTAMINATION AIR TARGET POPULATIONS

Distance from Site	Pop.	Nearest Individual (choose highest)	Number of People within the Distance Category												Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000	
On a source	0	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	0
0 to $\frac{1}{4}$ mile	399	*	1	4	13	41	131	408	1,304	4,081	13,034	40,812	130,340	408,114	131
$>\frac{1}{4}$ to $\frac{1}{2}$ mile	1,198	2	0.2	0.9	3	9	28	88	282	882	2,815	8,815	28,153	88,153	88
$>\frac{1}{2}$ to 1 mile	4,630	1	0.06	0.3	0.9	3	8	26	83	261	834	2,612	8,342	26,119	83
> 1 to 2 miles	18,717	0	0.02	0.09	0.3	0.8	3	8	27	83	266	833	2,659	8,326	83
> 2 to 3 miles	31,215	0	0.009	0.04	0.1	0.4	1	4	12	38	120	375	1,199	3,755	120
> 3 to 4 miles	43,750	0	0.005	0.02	0.07	0.2	0.7	2	7	23	73	229	730	2,285	73
	Nearest Individual =	20												Sum =	578

References 2, 59

* Score = 20 if the Nearest Individual is within $\frac{1}{8}$ mile of a source; score = 7 if the Nearest Individual is between $\frac{1}{8}$ and $\frac{1}{4}$ mile of a source.

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SI TABLE 23 (HRS TABLE 6-18): AIR PATHWAY VALUES FOR WETLAND AREA

Wetland Area	Assigned Value
< 1 acre	0
1 to 50 acres	25
> 50 to 100 acres	75
> 100 to 150 acres	125
> 150 to 200 acres	175
> 200 to 300 acres	250
> 300 to 400 acres	350
> 400 to 500 acres	450
> 500 acres	500

SI TABLE 24: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS

Distance	Distance Weight	Sensitive Environment Type and Value (from SI Tables 13 and 20)	Product
On a Source	0.10	x	
		x	
0 to 1/4 mile	0.025	x	
		x	
		x	
1/4 to 1/2 mile	0.0054	x	
		x	
		x	
1/2 to 1 mile	0.0016	x	
		x	
		x	
1 to 2 miles	0.0005	x 25 (46 acres of wetland)	0.013
		x	
		x	
2 to 3 miles	0.00023	x 75 (62 acres of wetland)	0.017
		x	
		x	
3 to 4 miles	0.00014	x 50 (CT NDDB point)	0.007
		x	
		x	
> 4 miles	0	x	
		Total Environments Score =	0.037

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AIR PATHWAY (concluded)

WASTE CHARACTERISTICS

9.	If any Actual Contamination Targets exist for the air pathway, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if there are no Actual Contamination Targets for the air pathway, assign the calculated HWQ score for sources available to air migration.	10 4
10.	Assign the highest air toxicity/mobility value from SI Table 21 or SF Table 3.	10 4
11.	Multiply the air pathway toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 100

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

AIR PATHWAY SCORE: $\frac{LE \times T \times WC}{82,500}$

$\frac{500 \times 83 \times 100}{82,500} = 50.3$

50
(maximum of 100)

CONFIDENTIAL

50

SITE SCORE CALCULATION	S	S^2
GROUND WATER PATHWAY SCORE (S_{GW})	100	10^4
SURFACE WATER PATHWAY SCORE (S_{SW})	100	10^4
SOIL EXPOSURE (S_S)	0	0
AIR PATHWAY SCORE (S_A)	50	2,500
SITE SCORE $\sqrt{\frac{S_{GW}^2+S_{SW}^2+S_S^2+S_A^2}{4}}$ = 75		75

$\sqrt{\frac{10^4+10^4+0+2,500}{4}} = \sqrt{5,625} = 75$

COMMENTS

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